

SUBELEMENT 2H - Signals and Emissions (2 Questions)

One (1) question should be from the following:

308. What keying method is used to transmit CW? [2H-1-1.1]
A. Frequency-shift keying of a radio-frequency signal
B. On/off keying of a radio-frequency signal
C. Audio-frequency-shift keying of an oscillator tone
D. On/off keying of an audio-frequency signal
309. What emission type describes international Morse code telegraphy messages? [2H-1-1.2]
A. RTTY
B. Image
C. CW
D. Phone
310. What emission type describes narrow-band direct-printing telegraphy emissions? [2H-1-2.1]
A. RTTY
B. Image
C. CW
D. Phone
311. What keying method is used to transmit RTTY messages? [2H-1-2.2]
A. Frequency-shift keying of a radio-frequency signal
B. On/off keying of a radio-frequency signal
C. Digital pulse-code keying of an unmodulated carrier
D. On/off keying of an audio-frequency signal
312. What emission type describes frequency-modulated voice transmissions? [2H-1-3.1]
A. FM phone
B. Image
C. CW
D. Single-sideband phone
313. What emission type describes single-sideband suppressed-carrier (SSB) voice transmissions? [2H-1-4.1]
A. FM phone
B. Image
C. CW
D. Sideband phone
314. What does the term key click mean? [2H-2.1]
A. The mechanical noise caused by closing a straight key too hard
B. The clicking noise from an excessively square CW keyed waveform
C. The sound produced in a receiver from a CW signal faster than 20 WPM
D. The sound of a CW signal being copied on an AM receiver
315. How can key clicks be eliminated? [2H-2.2]
A. By reducing your keying speed to less than 20 WPM
B. By increasing power to the maximum allowable level
C. By using a power supply with better regulation
D. By using a key-click filter
316. What does the term chirp mean? [2H-3.1]
A. A distortion in the receiver audio circuits
B. A high-pitched audio tone transmitted with a CW signal
C. A slight shift in oscillator frequency each time a CW transmitter is keyed
D. A slow change in transmitter frequency as the circuit warms up
317. What can be done to the power supply of a CW transmitter to avoid chirp? [2H-3.2]
A. Resonate the power supply filters
B. Regulate the power supply output voltages
C. Use a buffer amplifier between the transmitter output and the feed line
D. Hold the power supply current to a fixed value
318. What is a common cause of superimposed hum? [2H-4.1]
A. Using a nonresonant random-wire antenna
B. Sympathetic vibrations from a nearby transmitter
C. Improper neutralization of the transmitter output stage
D. A defective filter capacitor in the power supply
319. What type of problem can a bad power-supply filter capacitor cause in a transmitter or receiver? [2H-4.2]
A. Sympathetic vibrations in nearby receivers
B. A superimposed hum or buzzing sound
C. Extreme changes in antenna resonance
D. Imbalance in the mixers

One (1) question should be from the following:

320. What is the 4th harmonic of a 7160-kHz signal? [2H-5.1]

- A. 28,640 kHz
- B. 35,800 kHz
- C. 28,160 kHz
- D. 1790 kHz

321. You receive an FCC Notice of Violation stating that your station was heard on 21,375 kHz. At the time listed on the notice, you were operating on 7125 kHz. What is a possible cause of this violation? [2H-5.2]

- A. Your transmitter has a defective power-supply filter capacitor
- B. Your CW keying speed was excessively fast
- C. Your transmitter was radiating excess harmonic signals
- D. Your transmitter has a defective power-supply filter choke

322. What may happen to body tissues that are exposed to large amounts of UHF or microwave RF energy? [2H-6.1]

- A. The tissue may be damaged because of the heat produced
- B. The tissue may suddenly be frozen
- C. The tissue may be immediately destroyed because of the Maxwell Effect
- D. The tissue may become less resistant to cosmic radiation

323. What precaution should you take before working near a high-gain UHF or microwave antenna (such as a parabolic, or dish antenna)? [2H-6.2]

- A. Be certain the antenna is FCC type accepted
- B. Be certain the antenna and transmitter are properly grounded
- C. Be certain the transmitter cannot be operated
- D. Be certain the antenna safety interlocks are in place

324. You are installing a VHF or UHF mobile radio in your vehicle. What is the best location to mount the antenna on the vehicle to minimize any danger from RF exposure to the driver or passengers? [2H-6.3]

- A. In the middle of the roof
- B. Along the top of the windshield
- C. On either front fender
- D. On the trunk lid

325. You discover that your tube-type transmitter power amplifier is radiating spurious emissions. What is the most likely cause of this problem? [2H-7.1]

- A. Excessively fast keying speed
- B. Undermodulation
- C. Improper neutralization
- D. Tank-circuit current dip at resonance

326. Your transmitter radiates signals outside the amateur band where you are transmitting. What term describes this radiation? [2H-7.2]

- A. Off-frequency emissions
- B. Transmitter chirp
- C. Incidental radiation
- D. Spurious emissions

327. What problem can occur if you operate your transmitter without the cover and other shielding in place? [2H-7.3]

- A. Your transmitter can radiate spurious emissions
- B. Your transmitter may radiate a "chirpy" signal
- C. The final amplifier efficiency of your transmitter may decrease
- D. You may cause splatter interference to other stations operating on nearby frequencies

328. What type of interference will you cause if you operate your SSB transmitter with the microphone gain adjusted too high? [2H-7.4]

- A. You may cause digital interference to computer equipment in your neighborhood
- B. You may cause splatter interference to other stations operating on nearby frequencies
- C. You may cause atmospheric interference in the air around your antenna
- D. You may cause processor interference to the microprocessor in your rig

329. What may happen if you adjust the microphone gain or deviation control on your FM transmitter too high? [2H-7.5]

- A. You may cause digital interference to computer equipment in your neighborhood
- B. You may cause interference to other stations operating on nearby frequencies
- C. You may cause atmospheric interference in the air around your antenna
- D. You may cause processor interference to the microprocessor in your rig

330. What type of interference can excessive amounts of speech processing in your SSB transmitter cause? [2H-7.6]

- A. You may cause digital interference to computer equipment in your neighborhood
- B. You may cause splatter interference to other stations operating on nearby frequencies
- C. You may cause atmospheric interference in the air around your antenna
- D. You may cause processor interference to the microprocessor in your rig

SUBELEMENT 2I - Antennas and Feed Lines (3 Questions)

One (1) question should be from the following:

331. What is the approximate length (in feet) of a half-wavelength dipole antenna for 3725 kHz? [2I-1.1]

- A. 126 ft
- B. 81 ft
- C. 63 ft
- D. 40 ft

332. What is the approximate length (in feet) of a half-wavelength dipole antenna for 7125 kHz? [2I-1.2]

- A. 84 ft
- B. 42 ft
- C. 33 ft
- D. 66 ft

333. What is the approximate length (in feet) of a half-wavelength dipole antenna for 21,125 kHz? [2I-1.3]

- A. 44 ft
- B. 28 ft
- C. 22 ft
- D. 14 ft

334. What is the approximate length (in feet) of a half-wavelength dipole antenna for 28,150 kHz? [2I-1.4]

- A. 22 ft
- B. 11 ft
- C. 17 ft
- D. 34 ft

335. How is the approximate length (in feet) of a half-wavelength dipole antenna calculated? [2I-1.5]

- A. By substituting the desired operating frequency for f in the formula: $150 / f$ (in MHz)
- B. By substituting the desired operating frequency for f in the formula: $234 / f$ (in MHz)
- C. By substituting the desired operating frequency for f in the formula: $300 / f$ (in MHz)
- D. By substituting the desired operating frequency for f in the formula: $468 / f$ (in MHz)

336. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 3725 kHz? [2I-2.1]

- A. 20 ft
- B. 32 ft
- C. 40 ft
- D. 63 ft

337. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 7125 kHz? [2I-2.2]

- A. 11 ft
- B. 16 ft
- C. 21 ft
- D. 33 ft

338. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 21,125 kHz? [2I-2.3]

- A. 7 ft
- B. 11 ft
- C. 14 ft
- D. 22 ft

339. What is the approximate length (in feet) of a quarter-wavelength vertical antenna for 28,150 kHz? [2I-2.4]

- A. 5 ft
- B. 8 ft
- C. 11 ft
- D. 17 ft

340. When a vertical antenna is lengthened, what happens to its resonant frequency? [2I-2.5]
A. It decreases
B. It increases
C. It stays the same
D. It doubles
341. Why do many amateurs use a 5/8-wavelength vertical antenna rather than a 1/4-wavelength vertical antenna for their VHF or UHF mobile stations? [2I-3.1]
A. A 5/8-wavelength antenna can handle more power than a 1/4-wavelength antenna
B. A 5/8-wavelength antenna has more gain than a 1/4-wavelength antenna
C. A 5/8-wavelength antenna exhibits less corona loss than a 1/4-wavelength antenna
D. A 5/8-wavelength antenna looks more like a CB antenna, so it does not attract as much attention as a 1/4-wavelength antenna
342. What type of radiation pattern is produced by a 5/8-wavelength vertical antenna? [2I-3.2]
A. A pattern with most of the transmitted signal concentrated in two opposite directions
B. A pattern with the transmitted signal going equally in all compass directions, with most of the radiation going high above the horizon
C. A pattern with the transmitted signal going equally in all compass directions, with most of the radiation going close to the horizon
D. A pattern with more of the transmitted signal concentrated in one direction than in other directions
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- One (1) question should be from the following:**
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343. What type of antenna produces a radiation pattern with more of the transmitted signal concentrated in a particular direction than in other directions? [2I-4-1.1]
A. A dipole antenna
B. A vertical antenna
C. An isotropic antenna
D. A beam antenna
344. What type of radiation pattern is produced by a Yagi antenna? [2I-4-1.2]
A. A pattern with the transmitted signal spread out equally in all compass directions
B. A pattern with more of the transmitted signal concentrated in one direction than in other directions
C. A pattern with most of the transmitted signal concentrated in two opposite directions
D. A pattern with most of the transmitted signal concentrated at high radiation angles
345. Approximately how long (in wavelengths) is the driven element of a Yagi antenna? [2I-4-1.3]
A. 1/4 wavelength
B. 1/3 wavelength
C. 1/2 wavelength
D. 1 wavelength
346. On the Yagi antenna shown in Figure 2I-4, what is the name of section B? [2I-4-2.1]
A. Director
B. Reflector
C. Boom
D. Driven element
347. On the Yagi antenna shown in Figure 2I-4, what is the name of section C? [2I-4-2.2]
A. Director
B. Reflector
C. Boom
D. Driven element
348. On the Yagi antenna shown in Figure 2I-4, what is the name of section A? [2I-4-2.3]
A. Director
B. Reflector
C. Boom
D. Driven element
349. What are the names of the elements in a 3-element Yagi antenna? [2I-4-2.4]
A. Reflector, driven element and director
B. Boom, mast and reflector
C. Reflector, base and radiator
D. Driven element, trap and feed line
350. How should the antenna on a hand-held transceiver be positioned while you are transmitting? [2I-5.1]
A. Away from your head and away from others standing nearby
B. Pointed in the general direction of the repeater or other station you are transmitting to
C. Pointed in a general direction 90 degrees away from the repeater or other station you are transmitting to
D. With the top of the antenna angled down slightly to take the most advantage of ground reflections

351. Why should you always locate your antennas so that no one can come in contact with them while you are transmitting? [2I-5.2]

- A. Such contact can detune the antenna, causing television interference
- B. To prevent RF burns and excessive exposure to RF energy
- C. The antenna is more likely to radiate harmonics when it is touched
- D. Such contact may reflect the transmitted signal back to the transmitter, damaging the final amplifier

352. You are going to purchase a new antenna for your VHF or UHF hand-held radio. Which type of antenna is the best choice to produce a radiation pattern that will be least hazardous to your face and eyes? [2I-5.3]

- A. A 1/8-wavelength whip
- B. A 7/8-wavelength whip
- C. A 1/2-wavelength whip
- D. A short, helically wound, flexible antenna

One (1) question should be from the following:

353. What is a coaxial cable? [2I-6.1]

- A. Two parallel conductors encased along the edges of a flat plastic ribbon
- B. Two parallel conductors held at a fixed distance from each other by insulating rods
- C. Two conductors twisted around each other in a double spiral
- D. A center conductor encased in insulating material which is covered by a conducting sleeve or shield

354. What kind of antenna feed line is constructed of a center conductor encased in insulation which is then covered by an outer conducting shield and weatherproof jacket? [2I-6.2]

- A. Twin lead
- B. Coaxial cable
- C. Open-wire feed line
- D. Wave guide

355. What are some advantages of using coaxial cable as an antenna feed line? [2I-6.3]

- A. It is easy to make at home, and it has a characteristic impedance in the range of most common amateur antennas
- B. It is weatherproof, and it has a characteristic impedance in the range of most common amateur antennas
- C. It can be operated at a higher SWR than twin lead, and it is weatherproof
- D. It is unaffected by nearby metallic objects, and has a characteristic impedance that is higher than twin lead

356. What commonly-available antenna feed line can be buried directly in the ground for some distance without adverse effects? [2I-6.4]

- A. Twin lead
- B. Coaxial cable
- C. Parallel conductor
- D. Twisted pair

357. When an antenna feed line must be located near grounded metal objects, which commonly-available feed line should be used? [2I-6.5]

- A. Twisted pair
- B. Twin lead
- C. Coaxial cable
- D. Ladder-line

358. What is parallel-conductor feed line? [2I-7.1]

- A. Two conductors twisted around each other in a double spiral
- B. Two parallel conductors held a uniform distance apart by insulating material
- C. A conductor encased in insulating material which is then covered by a conducting shield and a weatherproof jacket
- D. A metallic pipe whose diameter is equal to or slightly greater than the wavelength of the signal being carried

359. How can TV-type twin lead be used as a feed line? [2I-7.2]

- A. By carefully running the feed line parallel to a metal post to ensure self resonance
- B. TV-type twin lead cannot be used in an amateur station
- C. By installing an impedance-matching network between the transmitter and feed line
- D. By using a high-power amplifier and installing a power attenuator between the transmitter and feed line

360. What are some advantages of using parallel-conductor feed line? [2I-7.3]

- A. It has a lower characteristic impedance than coaxial cable, and will operate at a higher SWR than coaxial cable
- B. It will operate at a higher SWR than coaxial cable, and it is unaffected by nearby metal objects
- C. It has a lower characteristic impedance than coaxial cable, and has less loss than coaxial cable
- D. It will operate at higher SWR than coaxial cable and it has less loss than coaxial cable

361. What are some disadvantages of using parallel-conductor feed line? [2I-7.4]

- A. It is affected by nearby metallic objects, and it has a characteristic impedance that is too high for direct connection to most amateur transmitters
- B. It is more difficult to make at home than coaxial cable and it cannot be operated at a high SWR
- C. It is affected by nearby metallic objects, and it cannot handle the power output of a typical amateur transmitter
- D. It has a characteristic impedance that is too high for direct connection to most amateur transmitters, and it will operate at a high SWR

362. What kind of antenna feed line is constructed of two conductors maintained a uniform distance apart by insulated spreaders? [2I-7.5]

- A. Coaxial cable
- B. Ladder-line open conductor line
- C. Twin lead in a plastic ribbon
- D. Twisted pair

363. A certain antenna has a feed-point impedance of 35 ohms. You want to use a 50-ohm-impedance coaxial cable to feed this antenna. What type of device will you need to connect between the antenna and the feed line? [2I-8.1]

- A. A balun
- B. An SWR bridge
- C. An impedance matching device
- D. A low-pass filter

364. A certain antenna system has an impedance of 1000 ohms on one band. What must you use to connect this antenna system to the 50-ohm output on your transmitter? [2I-8.2]

- A. A balun
- B. An SWR bridge
- C. An impedance matching device
- D. A low-pass filter

365. The word balun is a contraction for what phrase? [2I-9.1]

- A. Balanced-antenna-lobe use network
- B. Broadband-amplifier linearly unregulated
- C. Balanced unmodulator
- D. Balanced to unbalanced

366. Where would you install a balun if you wanted to feed your dipole antenna with 450-ohm parallel-conductor feed line? [2I-9.2]

- A. At the transmitter end of the feed line
- B. At the antenna feed point
- C. In only one conductor of the feed line
- D. From one conductor of the feed line to ground

367. Where might you install a balun if you wanted to feed your dipole antenna with 50-ohm coaxial cable? [2I-9.3]

- A. You might install a balun at the antenna feed point
- B. You might install a balun at the transmitter output
- C. You might install a balun 1/2 wavelength from the transmitter
- D. You might install baluns in the middle of each side of the dipole

368. A four-element Yagi antenna is mounted with its elements parallel to the ground. A signal produced by this antenna will have what type of polarization? [2I-10-1.1]

- A. Broadside polarization
- B. Circular polarization
- C. Horizontal polarization
- D. Vertical polarization

369. A four-element Yagi antenna is mounted with its elements perpendicular to the ground. A signal produced by this antenna will have what type of polarization? [2I-11-1.1]

- A. Broadside polarization
- B. Circular polarization
- C. Horizontal polarization
- D. Vertical polarization

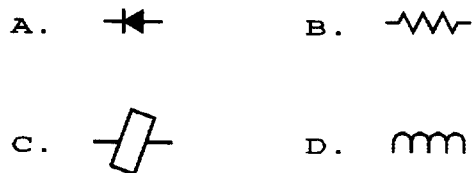


Diagram 2F-1.1

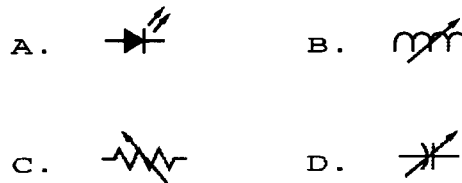


Diagram 2F-1.2

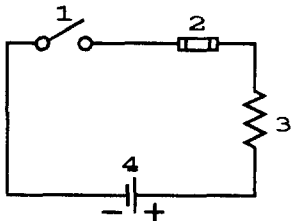


Diagram 2F-1

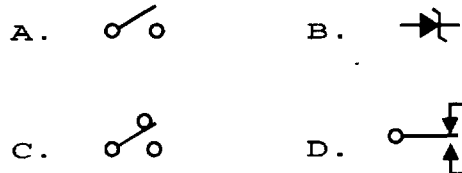


Diagram 2F-2.1

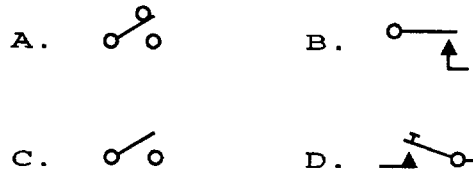


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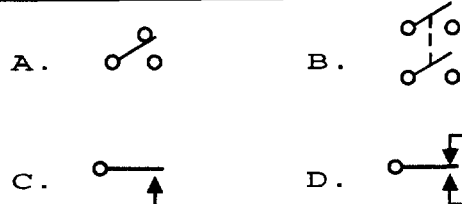


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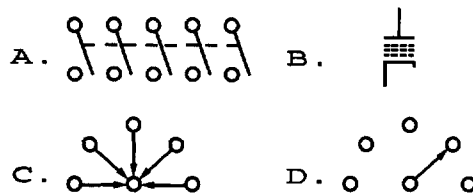


Diagram 2F-2.4

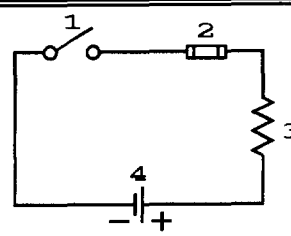


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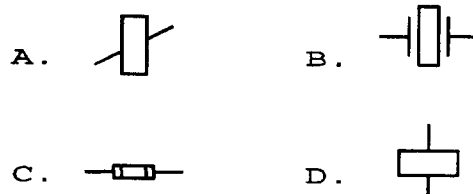


Diagram 2F-3.1

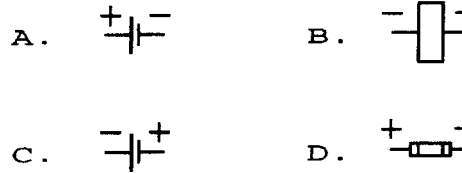


Diagram 2F-4.1

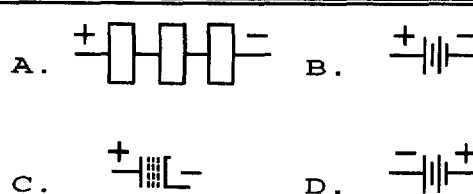


Diagram 2F-4.2

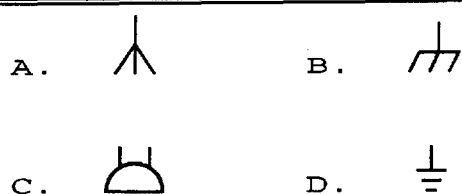
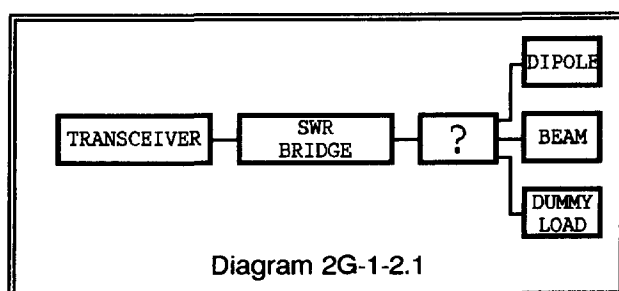
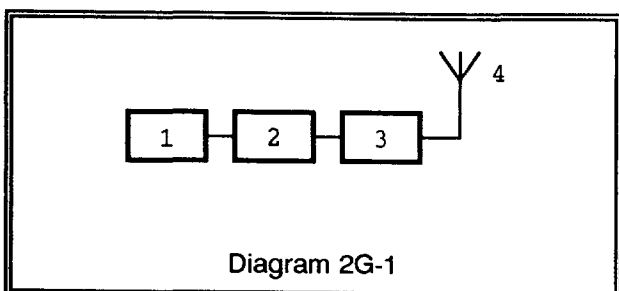
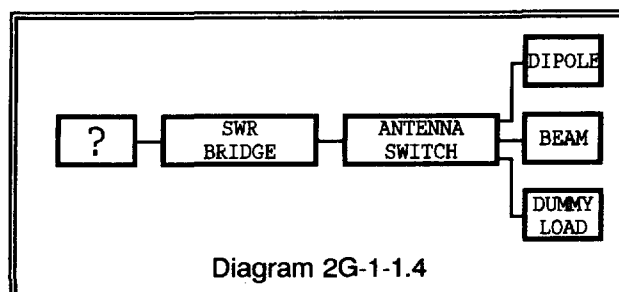
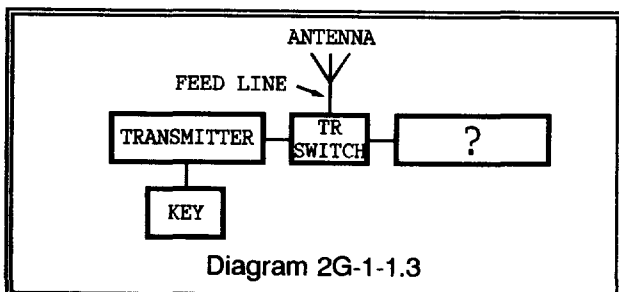
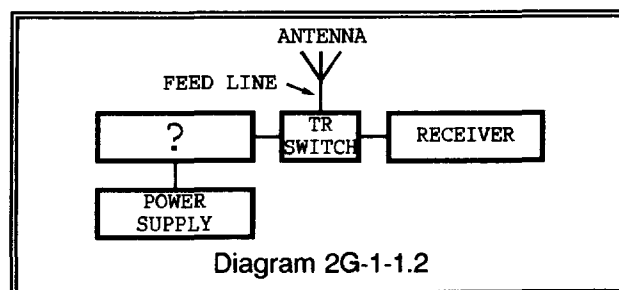
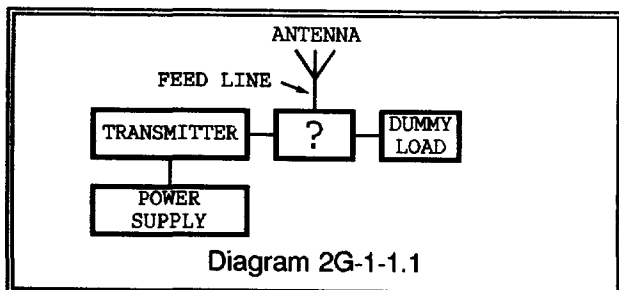
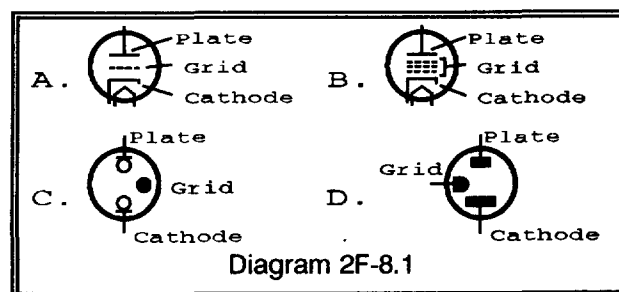
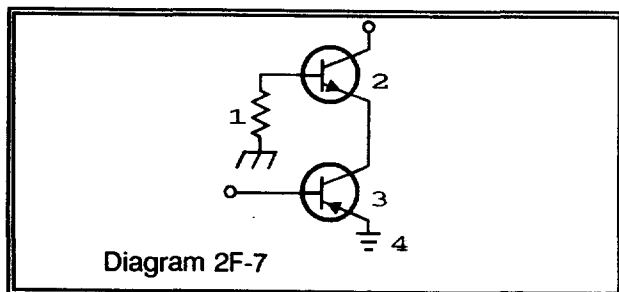
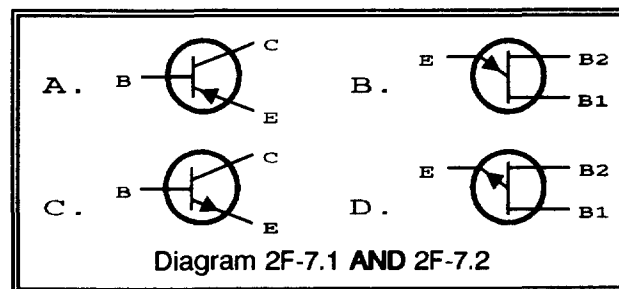
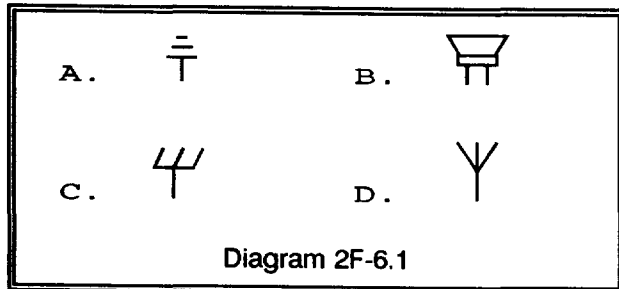
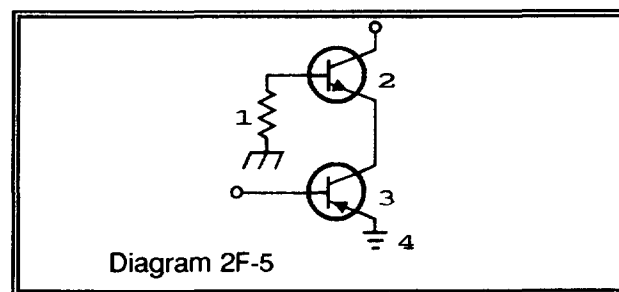
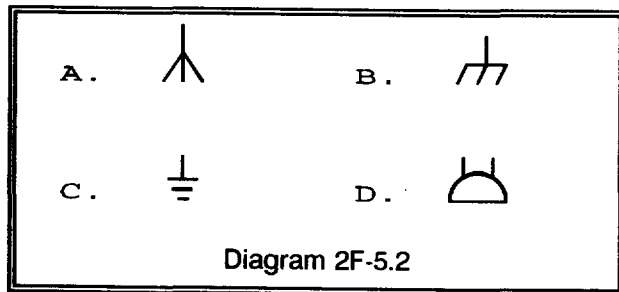
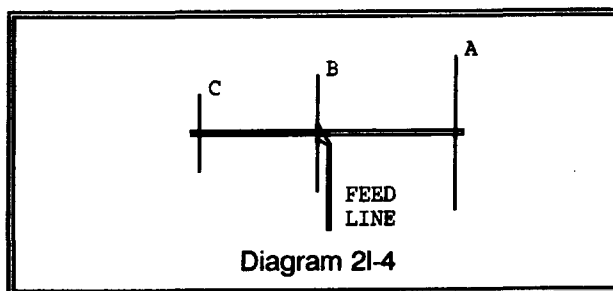
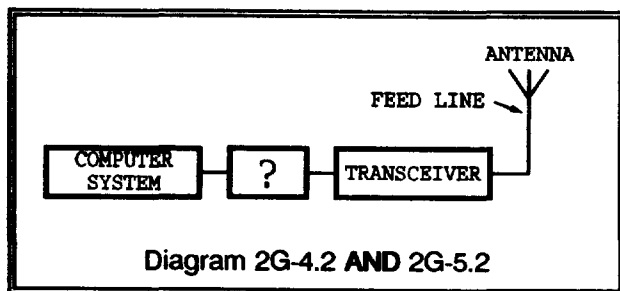
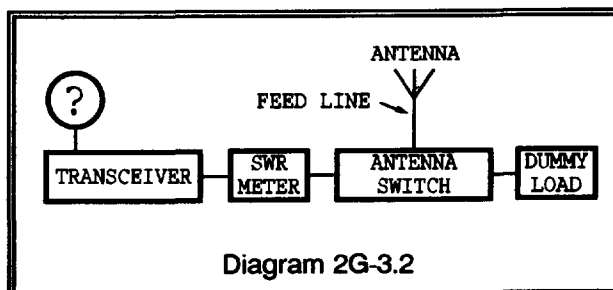
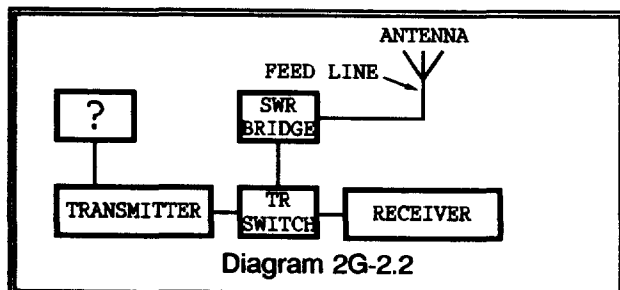
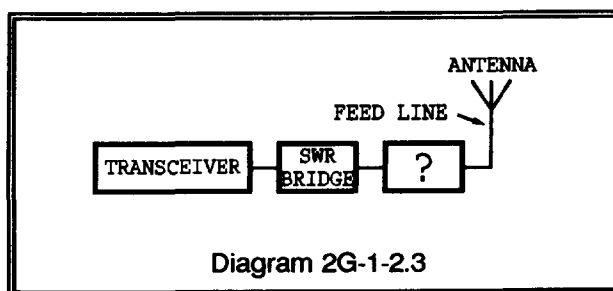
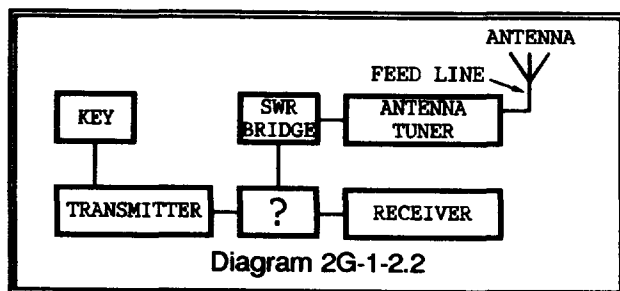


Diagram 2F-5.1





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|------------------|-------------------|--------------------|
| 1. A [2A-1.1] | 63. B [2A-19.5] | 125. A [2B-2-4.2] |
| 2. D [2A-1.2] | 64. C [2A-20.1] | 126. A [2B-2-4.3] |
| 3. D [2A-1.3] | 65. C [2A-20.2] | 127. D [2B-2-5.1] |
| 4. B [2A-1.4] | 66. D [2A-20.3] | 128. B [2B-2-5.2] |
| 5. C [2A-2.1] | 67. C [2A-21.1] | 129. A [2B-2-5.3] |
| 6. A [2A-2.2] | 68. A [2A-21.2] | 130. B [2B-2-6.1] |
| 7. A [2A-3.1] | 69. D [2A-21.3] | 131. C [2B-2-6.2] |
| 8. D [2A-3.2] | 70. B [2A-21.4] | 132. D [2B-2-6.3] |
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| 43. A [2A-17.2] | 105. A [2A-38.3] | 167. B [2C-3.2] |
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| 45. A [2A-17.4] | 107. B [2A-39.2] | 169. A [2C-3.4] |
| 46. D [2A-17.6] | 108. B [2A-39.3] | 170. C [2C-3.5] |
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| 49. C [2A-17.9] | 111. D [2A-40.3] | 173. D [2C-4.2] |
| 50. D [2A-17.10] | 112. A [2B-1-1.1] | 174. A [2C-5.1] |
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| 55. C [2A-18.2] | 117. B [2B-2-1.2] | 179. A [2D-1.2] |
| 56. C [2A-18.3] | 118. C [2B-2-2.1] | 180. D [2D-2.1] |
| 57. C [2A-18.4] | 119. C [2B-2-3.1] | 181. C [2D-2.2] |
| 58. C [2A-18.5] | 120. D [2B-2-3.2] | 182. D [2D-2.3] |
| 59. C [2A-19.1] | 121. A [2B-2-3.3] | 183. B [2D-2.4] |
| 60. B [2A-19.2] | 122. B [2B-2-3.4] | 184. A [2D-3.1] |
| 61. C [2A-19.3] | 123. C [2B-2-3.5] | 185. C [2D-3.2] |
| 62. D [2A-19.4] | 124. D [2B-2-4.1] | 186. B [2D-3.3] |

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188.	B	[2D-4.1]	250.	C	[2E-9-1.1]	312.	A	[2H-1-3.1]
189.	A	[2D-4.2]	251.	C	[2E-9-1.2]	313.	D	[2H-1-4.1]
190.	C	[2D-4.3]	252.	B	[2E-9-2.1]	314.	B	[2H-2.1]
191.	A	[2D-4.4]	253.	C	[2E-10.1]	315.	D	[2H-2.2]
192.	B	[2D-4.5]	254.	D	[2E-11.1]	316.	C	[2H-3.1]
193.	B	[2D-4.6]	255.	B	[2E-12-1.1]	317.	B	[2H-3.2]
194.	D	[2D-5.1]	256.	A	[2E-12-2.1]	318.	D	[2H-4.1]
195.	A	[2D-5.2]	257.	D	[2E-12-3.1]	319.	B	[2H-4.2]
196.	D	[2D-6.1]	258.	A	[2E-12-3.2]	320.	A	[2H-5.1]
197.	D	[2D-6.2]	259.	A	[2E-12-3.3]	321.	C	[2H-5.2]
198.	A	[2D-6.3]	260.	B	[2E-12-4.1]	322.	A	[2H-6.1]
199.	D	[2D-6.4]	261.	A	[2E-12-4.2]	323.	C	[2H-6.2]
200.	A	[2D-6.5]	262.	B	[2E-12-4.3]	324.	A	[2H-6.3]
201.	C	[2D-7-1.1]	263.	C	[2E-12-5.1]	325.	C	[2H-7.1]
202.	D	[2D-7-1.2]	264.	B	[2E-12-5.2]	326.	D	[2H-7.2]
203.	B	[2D-7-2.1]	265.	C	[2E-13.1]	327.	A	[2H-7.3]
204.	C	[2D-7-2.2]	266.	D	[2E-13.2]	328.	B	[2H-7.4]
205.	D	[2D-7-2.3]	267.	B	[2F-1.1]	329.	B	[2H-7.5]
206.	C	[2D-7-2.4]	268.	C	[2F-1.2]	330.	B	[2H-7.6]
207.	A	[2D-7-3.1]	269.	C	[2F-1.3]	331.	A	[2I-1.1]
208.	A	[2D-7-3.2]	270.	A	[2F-2.1]	332.	D	[2I-1.2]
209.	B	[2D-7-3.3]	271.	A	[2F-2.2]	333.	C	[2I-1.3]
210.	C	[2D-7-3.4]	272.	B	[2F-2.3]	334.	C	[2I-1.4]
211.	C	[2D-8-1.1]	273.	D	[2F-2.4]	335.	D	[2I-1.5]
212.	B	[2D-8-1.2]	274.	A	[2F-2.5]	336.	D	[2I-2.1]
213.	C	[2D-8-1.3]	275.	C	[2F-3.1]	337.	D	[2I-2.2]
214.	B	[2D-8-1.4]	276.	A	[2F-4.1]	338.	B	[2I-2.3]
215.	A	[2D-8-2.1]	277.	B	[2F-4.2]	339.	B	[2I-2.4]
216.	A	[2D-8-2.2]	278.	D	[2F-5.1]	340.	A	[2I-2.5]
217.	A	[2D-8-2.3]	279.	B	[2F-5.2]	341.	B	[2I-3.1]
218.	C	[2D-8-2.4]	280.	A	[2F-5.3]	342.	C	[2I-3.2]
219.	D	[2D-8-2.5]	281.	D	[2F-5.4]	343.	D	[2I-4-1.1]
220.	B	[2D-8-2.6]	282.	D	[2F-6.1]	344.	B	[2I-4-1.2]
221.	A	[2D-8-3.1]	283.	C	[2F-7.1]	345.	C	[2I-4-1.3]
222.	B	[2D-8-3.2]	284.	A	[2F-7.2]	346.	D	[2I-4-2.1]
223.	C	[2E-1-1.1]	285.	C	[2F-7.3]	347.	A	[2I-4-2.2]
224.	B	[2E-1-2.1]	286.	B	[2F-7.4]	348.	B	[2I-4-2.3]
225.	D	[2E-1-2.2]	287.	A	[2F-8.1]	349.	A	[2I-4-2.4]
226.	B	[2E-1-3.1]	288.	B	[2G-1-1.1]	350.	A	[2I-5.1]
227.	D	[2E-1-3.2]	289.	C	[2G-1-1.2]	351.	B	[2I-5.2]
228.	B	[2E-1-4.1]	290.	D	[2G-1-1.3]	352.	C	[2I-5.3]
229.	C	[2E-1-5.1]	291.	A	[2G-1-1.4]	353.	D	[2I-6.1]
230.	C	[2E-1-5.2]	292.	D	[2G-1-1.5]	354.	B	[2I-6.2]
231.	B	[2E-1-6.1]	293.	B	[2G-1-2.1]	355.	B	[2I-6.3]
232.	B	[2E-1-7.1]	294.	A	[2G-1-2.2]	356.	B	[2I-6.4]
233.	D	[2E-2-1.1]	295.	B	[2G-1-2.3]	357.	C	[2I-6.5]
234.	C	[2E-2-2.1]	296.	D	[2G-1-2.4]	358.	B	[2I-7.1]
235.	A	[2E-3-1.1]	297.	D	[2G-1-2.5]	359.	C	[2I-7.2]
236.	D	[2E-3-1.2]	298.	B	[2G-2.1]	360.	D	[2I-7.3]
237.	C	[2E-3-1.3]	299.	C	[2G-2.2]	361.	A	[2I-7.4]
238.	A	[2E-3-2.1]	300.	C	[2G-2.3]	362.	B	[2I-7.5]
239.	C	[2E-4.1]	301.	D	[2G-3.1]	363.	C	[2I-8.1]
240.	A	[2E-5.1]	302.	D	[2G-3.2]	364.	C	[2I-8.2]
241.	D	[2E-6-1.1]	303.	A	[2G-4.1]	365.	D	[2I-9.1]
242.	A	[2E-6-1.2]	304.	C	[2G-4.2]	366.	A	[2I-9.2]
243.	D	[2E-6-2.1]	305.	A	[2G-5.1]	367.	A	[2I-9.3]
244.	C	[2E-7.1]	306.	A	[2G-5.2]	368.	C	[2I-10-1.1]
245.	C	[2E-7.2]	307.	C	[2G-5.3]	369.	D	[2I-11-1.1]
246.	B	[2E-7.3]	308.	B	[2H-1-1.1]			
247.	C	[2E-7.4]	309.	C	[2H-1-1.2]			
248.	D	[2E-8.1]	310.	A	[2H-1-2.1]			

The Radio Amateur's

ELEMENT 3(A)

Technician Class Test Manual

Contains all questions & answers in the Technician Class VEC Question Pool

Updated for the new Codeless Technician rules

All accredited Volunteer Examiners (VE's) and Volunteer Examiner Coordinator (VEC) organizations are required to use these Technician Class questions verbatim in preparing their Element 3(A) examinations. These test questions were released into the public domain by the VEC organizations' Question Pool Committee on July 1, 1990. The purpose of this test manual is to alert the public to the content of the Element 3(A) question pool. It is not a study guide since no explanations of the answers are included.

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SUBELEMENT 3AA - Commission's Rules (5 Questions)

1. What is the control point of an amateur station? [3AA-1.1]
 - A. The location at which the control operator function is performed
 - B. The operating position of any Amateur Radio station operating as a repeater user station
 - C. The physical location of any Amateur Radio transmitter, even if it is operated by radio link from some other location
 - D. The variable frequency oscillator (VFO) of the transmitter
2. What is the term for the location at which the control operator function is performed? [3AA-1.2]
 - A. The operating desk
 - B. The control point
 - C. The station location
 - D. The manual control location
3. Which operator licenses authorize privileges on 52.525 MHz? [3AA-2.2]
 - A. Extra, Advanced only
 - B. Extra, Advanced, General only
 - C. Extra, Advanced, General, Technician only
 - D. Extra, Advanced, General, Technician, Novice
4. Which operator licenses authorize privileges on 146.52 MHz? [3AA-2.3]
 - A. Extra, Advanced, General, Technician, Novice
 - B. Extra, Advanced, General, Technician only
 - C. Extra, Advanced, General only
 - D. Extra, Advanced only
5. Which operator licenses authorize privileges on 223.50 MHz? [3AA-2.4]
 - A. Extra, Advanced, General, Technician, Novice
 - B. Extra, Advanced, General, Technician only
 - C. Extra, Advanced, General only
 - D. Extra, Advanced only
6. Which operator licenses authorize privileges on 446.0 MHz? [3AA-2.5]
 - A. Extra, Advanced, General, Technician, Novice
 - B. Extra, Advanced, General, Technician only
 - C. Extra, Advanced, General only
 - D. Extra, Advanced only
7. How often do amateur service licenses generally need to be renewed? [3AA-3.1]
 - A. Every 10 years
 - B. Every 5 years
 - C. Every 2 years
 - D. They are lifetime licenses
8. The FCC currently issues amateur licenses carrying 10-year terms. What is the "grace period" during which the FCC will renew an expired 10-year license? [3AA-3.2]
 - A. 2 years
 - B. 5 years
 - C. 10 years
 - D. There is no grace period
9. What action would you take to modify your operator/primary station license? [3AA-3.3]
 - A. Properly fill out FCC Form 610 and send it to the FCC in Gettysburg, PA
 - B. Properly fill out FCC Form 610 and send it to the nearest FCC field office
 - C. Write the FCC at their nearest field office
 - D. There is no need to modify an amateur license between renewals
10. On what frequencies within the 6-meter wavelength band may FM phone emissions be transmitted? [3AA-4.1]
 - A. 50.0-54.0 MHz only
 - B. 50.1-54.0 MHz only
 - C. 51.0-54.0 MHz only
 - D. 52.0-54.0 MHz only
11. On what frequencies within the 2-meter wavelength band may FM image emissions be transmitted? [3AA-4.2]
 - A. 144.1-148.0 MHz only
 - B. 146.0-148.0 MHz only
 - C. 144.0-148.0 MHz only
 - D. 146.0-147.0 MHz only
12. What emission type may always be used for station identification, regardless of the transmitting frequency? [3AA-4.3]
 - A. CW
 - B. RTTY
 - C. MCW
 - D. Phone
13. If you are using a frequency within a band designated to the amateur service on a secondary basis and another station assigned to a primary service on that band causes interference, what action should you take? [3AA-5.1]
 - A. Notify the FCC's regional Engineer in Charge of the interference
 - B. Increase your transmitter's power to overcome the interference
 - C. Attempt to contact the station and request that it stop the interference
 - D. Change frequencies; you may also be causing interference to the other station and that would be a violation of FCC rules

14. What is the basic principle of frequency sharing between two stations allocated to a primary service within a frequency band, but each in a different ITU Region or Subregion? [3AA-5.2]
- The station with a control operator holding a lesser class of license must yield the frequency to the station with a control operator holding a higher class license
 - The station with a lower power output must yield the frequency to the station with a higher power output
 - Both stations have an equal right to operate on the frequency
 - Stations in ITU Regions 1 and 3 must yield the frequency to stations in ITU Region 2
15. FCC Rules specify the maximum transmitter power that you may use with your Amateur Radio station. At what point in your station is the transmitter power measured? [3AA-6-1.1]
- By measuring the final amplifier supply voltage inside the transmitter or amplifier
 - By measuring the final amplifier supply current inside the transmitter or amplifier
 - At the antenna terminals of the transmitter or amplifier
 - On the antenna itself, after the feed line
16. What is the term used to define the average power supplied to the antenna transmission line during one RF cycle at the crest of the modulation envelope? [3AA-6-1.2]
- Peak transmitter power
 - Peak output power
 - Average radio-frequency power
 - Peak envelope power
17. Notwithstanding the numerical limitations in the FCC Rules, how much transmitting power shall be used by an amateur station? [3AA-6-2.1]
- There is no regulation other than the numerical limits
 - The minimum power level required to achieve S9 signal reports
 - The minimum power necessary to carry out the desired communication
 - The maximum power available, as long as it is under the allowable limit
18. What is the maximum transmitting power permitted an amateur station on 146.52 MHz? [3AA-6-3.1]
- 200 watts PEP output
 - 500 watts ERP
 - 1000 watts DC input
 - 1500 watts PEP output
19. What is the maximum transmitting power permitted an amateur station in beacon operation? [3AA-6-4.1]
- 10 watts PEP output
 - 100 watts PEP output
 - 500 watts PEP output
 - 1500 watts PEP output
20. What is the maximum sending speed permitted for a RTTY transmission between 28 and 50 MHz? [3AA-7-1.1]
- 56 kilobauds
 - 19.6 kilobauds
 - 1200 bauds
 - 300 bauds
21. What is the maximum sending speed permitted for a RTTY transmission between 50 and 220 MHz? [3AA-7-1.2]
- 56 kilobauds
 - 19.6 kilobauds
 - 1200 bauds
 - 300 bauds
22. What is the maximum sending speed permitted for a RTTY transmission above 220 MHz? [3AA-7-1.3]
- 300 bauds
 - 1200 bauds
 - 19.6 kilobauds
 - 56 kilobauds
23. What is the maximum frequency shift permitted for RTTY when transmitted below 50 MHz? [3AA-7-2.1]
- 100 Hz
 - 500 Hz
 - 1000 Hz
 - 5000 Hz
24. What is the maximum frequency shift permitted for RTTY when transmitted above 50 MHz? [3AA-7-2.2]
- 100 Hz or the sending speed, in bauds, whichever is greater
 - 500 Hz or the sending speed, in bauds, whichever is greater
 - The FCC rules do not specify a maximum frequency shift above 50 MHz
 - 5000 Hz or the sending speed, in bauds, whichever is greater
25. What is the maximum authorized bandwidth of an RTTY, data or multiplexed emission using a specified digital code within the frequency range of 50 to 225 MHz? [3AA-7-3.1]
- 20 kHz
 - 50 kHz
 - The total bandwidth shall not exceed that of a single-sideband emission
 - The total bandwidth shall not exceed 10 times that of a CW emission

26. What is the maximum authorized bandwidth of a RTTY, data or multiplexed emission using an unspecified digital code within the frequency range of 220 to 450 MHz? [3AA-7-3.2]
- A. 50 kHz
 - B. 150 kHz
 - C. 200 kHz
 - D. 100 kHz
27. What is the maximum authorized bandwidth of an RTTY, data or multiplexed emission using an unspecified digital code within the 420 to 450 MHz amateur band? [3AA-7-3.3]
- A. 50 kHz
 - B. 200 kHz
 - C. 300 kHz
 - D. 100 kHz
28. How must a control operator who has a Novice license and a Certificate of Successful Completion of Examination for Technician privileges identify the station when transmitting on 146.34 MHz? [3AA-8-1.1]
- A. The new Technician may not operate on 146.34 until his or her new license arrives
 - B. The licensee gives his or her call sign, followed by any suitable word that denotes the slant mark and the identifier "KT"
 - C. No special form of identification is needed
 - D. The licensee gives his or her call sign and states the location of the VE examination where he or she obtained the certificate of successful completion
29. Which language(s) must be used when making the station identification by telephony? [3AA-8-2.1]
- A. The language being used for the contact may be used if it is not English, providing the US has a third-party traffic agreement with that country
 - B. English must be used for identification
 - C. Any language may be used, if the country which uses that language is a member of the International Telecommunication Union
 - D. The language being used for the contact must be used for identification purposes
30. What does the FCC recommend to aid correct station identification when using phone? [3AA-8-3.1]
- A. A speech compressor
 - B. Q signals
 - C. A recognized phonetic alphabet
 - D. Unique words of the operator's choice
31. What is the term used to describe an amateur station transmitting communications for the purpose of observation of propagation and reception or other related experimental activities? [3AA-9-1.1]
- A. Beacon operation
 - B. Repeater operation
 - C. Auxiliary operation
 - D. Radio control operation
32. What class of amateur operator license must you hold to operate a beacon station? [3AA-9-2.1]
- A. Technician, General, Advanced or Amateur Extra class
 - B. General, Advanced or Amateur Extra class
 - C. Amateur Extra class only
 - D. Any license class
33. What is the maximum transmitter power an amateur station is permitted when transmitting signals to control a model craft? [3AA-10.1]
- A. One watt
 - B. One milliwatt
 - C. Two watts
 - D. Three watts
34. What minimum information must be indicated on the label affixed to a transmitter transmitting signals to control a model craft? [3AA-10.2]
- A. Station call sign
 - B. Station call sign and operating times
 - C. Station call sign and the station licensee's name and address
 - D. Station call sign, class of license, and operating times
35. What are the station identification requirements for an amateur station transmitting signals to control a model craft? [3AA-10.3]
- A. Once every ten minutes, and at the beginning and end of each transmission
 - B. Once every ten minutes
 - C. At the beginning and end of each transmission
 - D. Station identification is not required provided that a label indicating the station call sign and the station licensee's name and address is affixed to the station transmitter
36. Where must the writing indicating the station call sign and the licensee's name and address be affixed in order to operate under the special rules for radio control of remote model craft and vehicles? [3AA-10.4]
- A. It must be in the operator's possession
 - B. It must be affixed to the transmitter
 - C. It must be affixed to the craft or vehicle
 - D. It must be filed with the nearest FCC Field Office

37. If an amateur repeater is causing harmful interference to another amateur repeater and a frequency coordinator has coordinated (recommends) the operation of one station and not the other, who is primarily responsible for resolving the interference? [3AA-11-1.1]

- A. The licensee of the non-coordinated (unrecommended) repeater
- B. Both repeater licensees
- C. The licensee of the coordinated (recommended) repeater
- D. The frequency coordinator

38. If an amateur repeater is causing harmful interference to another amateur repeater and a frequency coordinator has coordinated (recommends) the operation of both stations, who is primarily responsible for resolving the interference? [3AA-11-1.2]

- A. The licensee of the repeater which has been coordinated for the longest period of time
- B. Both repeater licensees
- C. The licensee of the repeater which has been coordinated the most recently
- D. The frequency coordinator

39. If an amateur repeater is causing harmful interference to another amateur repeater and a frequency coordinator has not coordinated the operation of either station, who is primarily responsible for resolving the interference? [3AA-11-1.3]

- A. Both repeater licensees
- B. The licensee of the repeater which has been in operation for the longest period of time
- C. The licensee of the repeater which has been in operation for the shortest period of time
- D. The frequency coordinator

40. Under what circumstances does the FCC declare a temporary state of communication emergency? [3AA-11-2.1]

- A. When a declaration of war is received from Congress
- B. When the maximum usable frequency goes above 28 MHz
- C. When communications facilities in Washington, DC, are disrupted
- D. When a disaster disrupts normal communications systems in a particular area

41. By what means should a request for a declaration of a temporary state of communication emergency be initiated? [3AA-11-2.2]

- A. Communication with the FCC Engineer-In-Charge of the affected area
- B. Communication with the US senator or congressman for the area affected
- C. Communication with the local Emergency Coordinator
- D. Communication with the Chief of the FCC Private Radio Bureau

42. What information is included in an FCC declaration of a temporary state of communication emergency? [3AA-11-2.3]

- A. Designation of the areas affected and of organizations authorized to use radio communications in the affected area
- B. Designation of amateur frequency bands for use only by amateurs participating in emergency communications in the affected area, and complete suspension of Novice operating privileges for the duration of the emergency
- C. Any special conditions and special rules to be observed during the communication emergency
- D. Suspension of amateur rules regarding station identification and business communication

43. If a disaster disrupts normal communication systems in an area where the amateur service is regulated by the FCC, what kinds of transmissions are authorized to amateur stations in such an area? [3AA-11-2.4]

- A. Communications which are necessary to meet essential communication needs and facilitate relief actions
- B. Communications which allow a commercial business to continue to operate in the affected area
- C. Communications for which material compensation has been paid to the amateur operator for delivery into the affected area
- D. Communications which are to be used for program production or newsgathering for broadcasting purposes

44. What is meant by the term broadcasting? [3AA-12.1]

- A. Transmissions intended for reception by the general public, either direct or relayed
- B. Retransmission by automatic means of programs or signals emanating from any class of station other than amateur
- C. The transmission of any one-way radio communication, regardless of purpose or content
- D. Any one-way or two-way radio communication involving more than two stations

45. Which of the following is an amateur station that cannot automatically retransmit signals of other amateur stations? [3AA-12.2]

- A. Auxiliary station
- B. Repeater station
- C. Beacon station
- D. Space station

46. Which of the following is an amateur station that is permitted to automatically retransmit signals of other amateur stations? [3AA-12.3]

- A. Beacon station
- B. Space station
- C. Official bulletin station
- D. RACES station

47. Signals from what type of radio station may be directly retransmitted by an amateur station? [3AA-12.4]

- A. AM radio station
- B. Police or fire department radio station
- C. NOAA weather station
- D. US Government communications between the space shuttle and associated Earth stations with prior approval from the National Aeronautics and Space Administration (NASA)

48. When may US Government communications between the space shuttle and associated Earth stations be directly retransmitted by an amateur station? [3AA-12.5]

- A. After prior approval has been obtained from the FCC in Washington, DC
- B. No radio stations other than amateur may be retransmitted in the amateur service
- C. After prior approval has been obtained from the National Aeronautics and Space Administration (NASA)
- D. After prior approval has been obtained from the nearest FCC Engineer-In-Charge

49. What kinds of one-way communications by amateur stations are not considered broadcasting? [3AA-13.1]

- A. All types of one-way communications by amateurs are considered by the FCC as broadcasting
- B. Beacon operation, remote control of a device, emergency communications, information bulletins consisting solely of subject matter of direct interest to the amateur service, and telegraphy practice
- C. Only code-practice transmissions conducted simultaneously on all available amateur bands below 30 MHz and conducted for more than 40 hours per week are not considered broadcasting
- D. Only actual emergency communications during a declared communications emergency are exempt

50. Which of the following one-way communications may not be transmitted in the amateur service? [3AA-13.2]

- A. Transmissions to remotely control a device at a distant location
- B. Transmissions to assist persons learning or improving their proficiency in Morse code
- C. Brief transmissions to make adjustments to the station
- D. Transmission of music

51. What kinds of one-way information bulletins may be transmitted by amateur stations? [3AA-13.3]

- A. NOAA weather bulletins
- B. Commuter traffic reports from local radio stations
- C. Regularly scheduled announcements concerning Amateur Radio equipment for sale or trade
- D. Messages directed only to amateur operators consisting solely of subject matter of direct interest to the amateur service

52. What types of one-way amateur communications may be transmitted by an amateur station? [3AA-13.4]

- A. Beacon operation, radio control, code practice, retransmission of other services
- B. Beacon operation, radio control, transmitting an unmodulated carrier, NOAA weather bulletins
- C. Beacon operation, remote control of a device, information bulletins consisting solely of subject matter of direct interest to the amateur service, telegraphy practice and emergency communications
- D. Beacon operation, emergency-drill-practice transmissions, automatic retransmission of NOAA weather transmissions, code practice

53. What types of material compensation, if any, may be involved in third-party traffic transmitted by an amateur station? [3AA-14.1]

- A. Payment of an amount agreed upon by the amateur operator and the parties involved
- B. Assistance in maintenance of auxiliary station equipment
- C. Donation of amateur equipment to the control operator
- D. No compensation may be accepted

54. What types of business communications, if any, may be transmitted by an amateur station on behalf of a third party? [3AA-14.2]

- A. The FCC rules specifically prohibit communications with a business for any reason
- B. Business communications involving the sale of Amateur Radio equipment
- C. Communications to a business may be provided during an emergency as provided by the FCC rules
- D. Business communications aiding a broadcast station

55. Does the FCC allow third-party messages when communicating with Amateur Radio operators in a foreign country? [3AA-14.3]

- A. Third-party messages with a foreign country are only allowed on behalf of other amateurs.
- B. Yes, provided the third-party message involves the immediate family of one of the communicating amateurs
- C. Under no circumstances may US amateurs exchange third-party messages with an amateur in a foreign country
- D. Yes, when communicating with a person in a country with which the US shares a third-party agreement

56. Under what circumstances, if any, may a third party participate in radio communications from an amateur station if the third party is ineligible to be a control operator of one of the stations? [3AA-15.1]

- A. A control operator must be present at the control point and continuously monitor and supervise the third party participation. Also, contacts may only be made with amateurs in the US and countries with which the US has a third-party communications agreement
- B. A control operator must be present and continuously monitor and supervise the radio communication to ensure compliance with the rules only if contacts are made with amateurs in countries with which the US has no third-party traffic agreement
- C. A control operator must be present and continuously monitor and supervise the radio communication to ensure compliance with the rules. In addition, the control operator must key the transmitter and make the station identification.
- D. A control operator must be present and continuously monitor and supervise the radio communication to ensure compliance with the rules. In addition, if contacts are made on frequencies below 30 MHz, the control operator must transmit the call signs of both stations involved in the contact at 10-minute intervals

57. Where must the control operator be situated when a third party is participating in radio communications from an amateur station? [3AA-15.2]

- A. If a radio remote control is used, the control operator may be physically separated from the control point, when provisions are incorporated to shut off the transmitter by remote control
- B. If the control operator supervises the third party until he or she is satisfied of the competence of the third party, the control operator may leave the control point
- C. The control operator must be present at the control point
- D. If the third party holds a valid radiotelegraph license issued by the FCC, no supervision is necessary

58. What must the control operator do while a third party is participating in radio communications? [3AA-15.3]

- A. If the third party holds a valid commercial radiotelegraph license, no supervision is necessary
- B. The control operator must tune up and down 5 kHz from the transmitting frequency on another receiver, to ensure that no interference is taking place
- C. If a radio control link is available, the control operator may leave the room
- D. The control operator must continuously monitor and supervise the third party's participation

59. In an exchange of international third-party communications, when is the station identification procedure required? [3AA-15.4]

- A. Only at the beginning of the communications
- B. At the end of each exchange of communications
- C. The station identification procedure is not required during international third-party communications
- D. Only at the end of multiple exchanges of communications

60. Under what circumstances, if any, may an amateur station transmit radio communications containing obscene words? [3AA-16.1]

- A. Obscene words are permitted when they do not cause interference to any other radio communication or signal
- B. Obscene words are prohibited in Amateur Radio transmissions
- C. Obscene words are permitted when they are not retransmitted through repeater or auxiliary stations
- D. Obscene words are permitted, but there is an unwritten rule among amateurs that they should not be used on the air

61. Under what circumstances, if any, may an amateur station transmit radio communications containing indecent words? [3AA-16.2]

- A. Indecent words are permitted when they do not cause interference to any other radio communication or signal
- B. Indecent words are permitted when they are not retransmitted through repeater or auxiliary stations
- C. Indecent words are permitted, but there is an unwritten rule among amateurs that they should not be used on the air
- D. Indecent words are prohibited in Amateur Radio transmissions

62. Under what circumstances, if any, may an amateur station transmit radio communications containing profane words? [3AA-16.3]

- A. Profane words are permitted when they are not retransmitted through repeater or auxiliary stations
- B. Profane words are permitted, but there is an unwritten rule among amateurs that they should not be used on the air
- C. Profane words are prohibited in Amateur Radio transmissions
- D. Profane words are permitted when they do not cause interference to any other radio communication or signal

63. Which of the following VHF/UHF bands may not be used by Earth stations for satellite communications? [3AA-17.1]

- A. 6 meters
- B. 2 meters
- C. 1.25 meters
- D. 70 centimeters

SUBLELEMENT 3AB - Operating Procedures (3 Questions)

64. What is the meaning of: "Your report is five seven..."? [3AB-1.1]

- A. Your signal is perfectly readable and moderately strong
- B. Your signal is perfectly readable, but weak
- C. Your signal is readable with considerable difficulty
- D. Your signal is perfectly readable with near pure tone

65. What is the meaning of: "Your report is three three..."? [3AB-1.2]

- A. The contact is serial number thirty-three
- B. The station is located at latitude 33 degrees
- C. Your signal is readable with considerable difficulty and weak in strength
- D. Your signal is unreadable, very weak in strength

66. What is the meaning of: "Your report is five nine plus 20 dB..."? [3AB-1.3]

- A. Your signal strength has increased by a factor of 100
- B. Repeat your transmission on a frequency 20 kHz higher
- C. The bandwidth of your signal is 20 decibels above linearity
- D. A relative signal-strength meter reading is 20 decibels greater than strength 9

67. How should a QSO be initiated through a station in repeater operation? [3AB-2-1.1]

- A. Say "breaker, breaker 79"
- B. Call the desired station and then identify your own station
- C. Call "CQ" three times and identify three times
- D. Wait for a "CQ" to be called and then answer it

68. Why should users of a station in repeater operation pause briefly between transmissions? [3AB-2-1.2]

- A. To check the SWR of the repeater
- B. To reach for pencil and paper for third party traffic
- C. To listen for any hams wanting to break in
- D. To dial up the repeater's autopatch

69. Why should users of a station in repeater operation keep their transmissions short and thoughtful? [3AB-2-1.3]

- A. A long transmission may prevent someone with an emergency from using the repeater
- B. To see if the receiving station operator is still awake
- C. To give any non-hams that are listening a chance to respond
- D. To keep long-distance charges down

70. What is the proper procedure to break into an on-going QSO through a station in repeater operation? [3AB-2-1.4]

- A. Wait for the end of a transmission and start calling
- B. Shout, "break, break!" to show that you're eager to join the conversation
- C. Turn on your 100-watt amplifier and override whoever is talking
- D. Send your call sign during a break between transmissions

71. What is the purpose of repeater operation? [3AB-2-1.5]

- A. To cut your power bill by using someone's higher power system
- B. To enable mobile and low-power stations to extend their usable range
- C. To reduce your telephone bill
- D. To call the ham radio distributor 50 miles away

72. What is meant by "making the repeater time out"? [3AB-2-1.6]

- A. The repeater's battery supply has run out
- B. The repeater's transmission time limit has expired during a single transmission
- C. The warranty on the repeater duplexer has expired
- D. The repeater is in need of repairs

73. During commuting rush hours, which types of operation should relinquish the use of the repeater? [3AB-2-1.7]

- A. Mobile operators
- B. Low-power stations
- C. Highway traffic information nets
- D. Third-party communications nets

74. Why should simplex be used where possible instead of using a station in repeater operation? [3AB-2-2.1]

- A. Farther distances can be reached
- B. To avoid long distance toll charges
- C. To avoid tying up the repeater unnecessarily
- D. To permit the testing of the effectiveness of your antenna

75. When a frequency conflict arises between a simplex operation and a repeater operation, why does good amateur practice call for the simplex operation to move to another frequency? [3AB-2-2.2]

- A. The repeater's output power can be turned up to ruin the front end of the station in simplex operation
- B. There are more repeaters than simplex operators
- C. Changing the repeater's frequency is not practical
- D. Changing a repeater frequency requires the authorization of the Federal Communications Commission

76. What is the usual input/output frequency separation for stations in repeater operation in the 2-meter wavelength band? [3AB-2-3.1]

- A. 1 MHz
- B. 1.6 MHz
- C. 170 Hz
- D. 0.6 MHz

77. What is the usual input/output frequency separation for stations in repeater operation in the 70-centimeter band? [3AB-2-3.2]

- A. 1.6 MHz
- B. 5 MHz
- C. 600 kHz
- D. 5 kHz

78. What is the usual input/output frequency separation for a 6-meter station in repeater operation? [3AB-2-3.3]

- A. 1 MHz
- B. 600 kHz
- C. 1.6 MHz
- D. 20 kHz

79. What is the usual input/output frequency separation for a 1.25-meter station in repeater operation? [3AB-2-3.4]

- A. 1000 kHz
- B. 600 kHz
- C. 1600 kHz
- D. 1.6 GHz

80. What is a repeater frequency coordinator? [3AB-2-4.1]

- A. Someone who coordinates the assembly of a repeater station
- B. Someone who provides advice on what kind of system to buy
- C. The club's repeater trustee
- D. A person or group that recommends frequency pairs for repeater usage

81. Why should local amateur communications be conducted on VHF and UHF frequencies? [3AB-3.1]
- A. To minimize interference on HF bands capable of long-distance sky-wave communication
 - B. Because greater output power is permitted on VHF and UHF
 - C. Because HF transmissions are not propagated locally
 - D. Because absorption is greater at VHF and UHF frequencies
82. How can on-the-air transmissions be minimized during a lengthy transmitter testing or loading up procedure? [3AB-3.2]
- A. Choose an unoccupied frequency
 - B. Use a dummy antenna
 - C. Use a non-resonant antenna
 - D. Use a resonant antenna that requires no loading up procedure
83. What is the proper Q signal to use to determine whether a frequency is in use before making a transmission? [3AB-3.3]
- A. QRV?
 - B. QRU?
 - C. QRL?
 - D. QRZ?
84. What is the proper distress calling procedure when using telephony? [3AB-4.1]
- A. Transmit MAYDAY
 - B. Transmit QRRR
 - C. Transmit QRZ
 - D. Transmit SOS
85. What is the proper distress calling procedure when using telegraphy? [3AB-4.2]
- A. Transmit MAYDAY
 - B. Transmit QRRR
 - C. Transmit QRZ
 - D. Transmit SOS
86. What is one requirement you must meet before you can participate in RACES drills? [3AB-5-1.1]
- A. You must be registered with ARRL
 - B. You must be registered with a local racing organization
 - C. You must be registered with the responsible civil defense organization
 - D. You need not register with anyone to operate RACES
87. What is the maximum amount of time allowed per week for RACES drills? [3AB-5-1.2]
- A. Eight hours
 - B. One hour
 - C. As many hours as you want
 - D. Six hours, but not more than one hour per day
88. How must you identify messages sent during a RACES drill? [3AB-5-2.1]
- A. As emergency messages
 - B. As amateur traffic
 - C. As official government messages
 - D. As drill or test messages
89. What is the term used to describe first-response communications in an emergency situation? [3AB-6-1.1]
- A. Tactical communications
 - B. Emergency communications
 - C. Formal message traffic
 - D. National Traffic System messages
90. What is one reason for using tactical call signs such as "command post" or "weather center" during an emergency? [3AB-6-1.2]
- A. They keep the general public informed about what is going on
 - B. They promote efficiency and coordination in public-service communications activities
 - C. They are required by the FCC
 - D. They promote goodwill among amateurs
91. What is the term used to describe messages sent into or out of a disaster area that pertain to a person's well being? [3AB-6-2.1]
- A. Emergency traffic
 - B. Tactical traffic
 - C. Formal message traffic
 - D. Health and welfare traffic
92. Why is it important to provide a means of operating your amateur station separate from the commercial AC power lines? [3AB-6-3.1]
- A. So that you can take your station mobile
 - B. So that you can provide communications in an emergency
 - C. So that you can operate field day
 - D. So that you will comply with Subpart 97.169 of the FCC Rules
93. Which type of antenna would be a good choice as part of a portable HF amateur station that could be set up in case of a communications emergency? [3AB-6-3.2]
- A. A three-element quad
 - B. A three-element Yagi
 - C. A dipole
 - D. A parabolic dish

SUBELEMENT 3AC - Radio-Wave Propagation (3 Questions)

94. What is the ionosphere? [3AC-1-1.1]
- A. That part of the upper atmosphere where enough ions and free electrons exist to affect radio-wave propagation
 - B. The boundary between two air masses of different temperature and humidity, along which radio waves can travel
 - C. The ball that goes on the top of a mobile whip antenna
 - D. That part of the atmosphere where weather takes place
95. What is the region of the outer atmosphere that makes long-distance radio communications possible as a result of bending of radio waves? [3AC-1-1.2]
- A. Troposphere
 - B. Stratosphere
 - C. Magnetosphere
 - D. Ionosphere
96. What type of solar radiation is most responsible for ionization in the outer atmosphere? [3AC-1-1.3]
- A. Thermal
 - B. Ionized particle
 - C. Ultraviolet
 - D. Microwave
97. Which ionospheric layer limits daytime radio communications in the 80-meter wavelength band to short distances? [3AC-1-2.1]
- A. D layer
 - B. F1 layer
 - C. E layer
 - D. F2 layer
98. What is the lowest ionospheric layer? [3AC-1-2.2]
- A. The A layer
 - B. The D layer
 - C. The E layer
 - D. The F layer
99. What is the lowest region of the ionosphere that is useful for long-distance radio wave propagation? [3AC-1-3.1]
- A. The D layer
 - B. The E layer
 - C. The F1 layer
 - D. The F2 layer
100. Which layer of the ionosphere is mainly responsible for long-distance sky-wave radio communications? [3AC-1-4.1]
- A. D layer
 - B. E layer
 - C. F1 layer
 - D. F2 layer
101. What are the two distinct sub-layers of the F layer of the ionosphere during the daytime? [3AC-1-4.2]
- A. Troposphere and stratosphere
 - B. F1 and F2
 - C. Electrostatic and electromagnetic
 - D. D and E
102. Which two daytime ionospheric layers combine into one layer at night? [3AC-1-4.3]
- A. E and F1
 - B. D and E
 - C. F1 and F2
 - D. E1 and E2
103. Which layer of the ionosphere is most responsible for absorption of radio signals during daylight hours? [3AC-2.1]
- A. The E layer
 - B. The F1 layer
 - C. The F2 layer
 - D. The D layer
104. When is ionospheric absorption most pronounced? [3AC-2.2]
- A. When tropospheric ducting occurs
 - B. When radio waves enter the D layer at low angles
 - C. When radio waves travel to the F layer
 - D. When a temperature inversion occurs
105. During daylight hours, what effect does the D layer of the ionosphere have on 80-meter radio waves? [3AC-2.3]
- A. The D layer absorbs the signals
 - B. The D layer bends the radio waves out into space
 - C. The D layer refracts the radio waves back to earth
 - D. The D layer has little or no effect on 80-meter radio wave propagation
106. What causes ionospheric absorption of radio waves? [3AC-2.4]
- A. A lack of D layer ionization
 - B. D layer ionization
 - C. The presence of ionized clouds in the E layer
 - D. Splitting of the F layer
107. What is usually the condition of the ionosphere just before sunrise? [3AC-3.1]
- A. Atmospheric attenuation is at a maximum
 - B. Ionization is at a maximum
 - C. The E layer is above the F layer
 - D. Ionization is at a minimum

108. At what time of day does maximum ionization of the ionosphere occur? [3AC-3.2]
A. Dusk
B. Midnight
C. Midday
D. Dawn
109. Minimum ionization of the ionosphere occurs daily at what time? [3AC-3.3]
A. Shortly before dawn
B. Just after noon
C. Just after dusk
D. Shortly before midnight
110. When is E layer ionization at a maximum? [3AC-3.4]
A. Dawn
B. Midday
C. Dusk
D. Midnight
111. What is the name for the highest radio frequency that will be refracted back to earth? [3AC-4.1]
A. Lowest usable frequency
B. Optimum working frequency
C. Ultra high frequency
D. Critical frequency
112. What causes the maximum usable frequency to vary? [3AC-4.2]
A. Variations in the temperature of the air at ionospheric levels
B. Upper-atmospheric wind patterns
C. The amount of ultraviolet and other types of radiation received from the sun
D. Presence of ducting
113. What does the term maximum usable frequency refer to? [3AC-4.3]
A. The maximum frequency that allows a radio signal to reach its destination in a single hop
B. The minimum frequency that allows a radio signal to reach its destination in a single hop
C. The maximum frequency that allows a radio signal to be absorbed in the lowest ionospheric layer
D. The minimum frequency that allows a radio signal to be absorbed in the lowest ionospheric layer
114. When two stations are within each other's skip zone on the frequency being used, what mode of propagation would it be desirable to use? [3AC-5.1]
A. Ground wave propagation
B. Sky wave propagation
C. Scatter-mode propagation
D. Ionospheric ducting propagation
115. You are in contact with a distant station and are operating at a frequency close to the maximum usable frequency. If the received signals are weak and somewhat distorted, what type of propagation are you probably experiencing? [3AC-5.2]
A. Tropospheric ducting
B. Line-of-sight propagation
C. Backscatter propagation
D. Waveguide propagation
116. What is the transmission path of a wave that travels directly from the transmitting antenna to the receiving antenna called? [3AC-6.1]
A. Line of sight
B. The sky wave
C. The linear wave
D. The plane wave
117. How are VHF signals within the range of the visible horizon propagated? [3AC-6.2]
A. By sky wave
B. By direct wave
C. By plane wave
D. By geometric wave
118. Ducting occurs in which region of the atmosphere? [3AC-7.1]
A. F2
B. Ionosphere
C. Troposphere
D. Stratosphere
119. What effect does tropospheric bending have on 2-meter radio waves? [3AC-7.2]
A. It increases the distance over which they can be transmitted
B. It decreases the distance over which they can be transmitted
C. It tends to garble 2-meter phone transmissions
D. It reverses the sideband of 2-meter phone transmissions
120. What atmospheric phenomenon causes tropospheric ducting of radio waves? [3AC-7.3]
A. A very low pressure area
B. An aurora to the north
C. Lightning between the transmitting and receiving station
D. A temperature inversion
121. Tropospheric ducting occurs as a result of what phenomenon? [3AC-7.4]
A. A temperature inversion
B. Sun spots
C. An aurora to the north
D. Lightning between the transmitting and receiving station

122. What atmospheric phenomenon causes VHF radio waves to be propagated several hundred miles through stable air masses over oceans? [3AC-7.5]

- A. Presence of a maritime polar air mass
- B. A widespread temperature inversion
- C. An overcast of cirriform clouds
- D. Atmospheric pressure of roughly 29 inches of mercury or higher

123. In what frequency range does tropospheric ducting occur most often? [3AC-7.6]

- A. LF
- B. MF
- C. HF
- D. VHF

SUBELEMENT 3AD - Amateur Radio Practice (4 Questions)

124. Where should the green wire in an AC line cord be attached in a power supply? [3AD-1-1.1]

- A. To the fuse
- B. To the "hot" side of the power switch
- C. To the chassis
- D. To the meter

125. Where should the black (or red) wire in a three-wire line cord be attached in a power supply? [3AD-1-1.2]

- A. To the filter capacitor
- B. To the DC ground
- C. To the chassis
- D. To the fuse

126. Where should the white wire in a three-wire line cord be attached in a power supply? [3AD-1-1.3]

- A. To the side of the transformer's primary winding that has a fuse
- B. To the side of the transformer's primary winding without a fuse
- C. To the black wire
- D. To the rectifier junction

127. Why is the retaining screw in one terminal of a light socket made of brass while the other one is silver colored? [3AD-1-1.4]

- A. To prevent galvanic action
- B. To indicate correct wiring polarity
- C. To better conduct current
- D. To reduce skin effect

128. How much electrical current flowing through the human body is usually fatal? [3AD-1-2.1]

- A. As little as 100 milliamperes may be fatal
- B. Approximately 10 amperes is required to be fatal
- C. More than 20 amperes is needed to kill a human being
- D. No amount of current will harm you. Voltages of over 2000 volts are always fatal, however

129. What is the minimum voltage considered to be dangerous to humans? [3AD-1-2.2]

- A. 30 volts
- B. 100 volts
- C. 1000 volts
- D. 2000 volts

130. How much electrical current flowing through the human body is usually painful? [3AD-1-2.3]

- A. As little as 50 milliamperes may be painful
- B. Approximately 10 amperes is required to be painful
- C. More than 20 amperes is needed to be painful to a human being
- D. No amount of current will be painful. Voltages of over 2000 volts are always painful, however

131. Where should the main power-line switch for a high voltage power supply be situated? [3AD-1-3.1]

- A. Inside the cabinet, to interrupt power when the cabinet is opened
- B. On the rear panel of the high-voltage supply
- C. Where it can be seen and reached easily
- D. This supply should not be switch-operated

132. How is a voltmeter typically connected to a circuit under test? [3AD-2-1.1]

- A. In series with the circuit
- B. In parallel with the circuit
- C. In quadrature with the circuit
- D. In phase with the circuit

133. How can the range of a voltmeter be extended? [3AD-2-2.1]

- A. By adding resistance in series with the circuit under test
- B. By adding resistance in parallel with the circuit under test
- C. By adding resistance in series with the meter
- D. By adding resistance in parallel with the meter

134. How is an ammeter typically connected to a circuit under test? [3AD-3-1.1]
- In series with the circuit
 - In parallel with the circuit
 - In quadrature with the circuit
 - In phase with the circuit
135. How can the range of an ammeter be extended? [3AD-3-2.1]
- By adding resistance in series with the circuit under test
 - By adding resistance in parallel with the circuit under test
 - By adding resistance in series with the meter
 - By adding resistance in parallel with the meter
136. What is a multimeter? [3AD-4.1]
- An instrument capable of reading SWR and power
 - An instrument capable of reading resistance, capacitance and inductance
 - An instrument capable of reading resistance and reactance
 - An instrument capable of reading voltage, current and resistance
137. Where in the antenna transmission line should a peak-reading wattmeter be attached to determine the transmitter output power? [3AD-5-1.1]
- At the transmitter output
 - At the antenna feed point
 - One-half wavelength from the antenna feed point
 - One-quarter wavelength from the transmitter output
138. For the most accurate readings of transmitter output power, where should the RF wattmeter be inserted? [3AD-5-1.2]
- The wattmeter should be inserted and the output measured one-quarter wavelength from the antenna feed point
 - The wattmeter should be inserted and the output measured one-half wavelength from the antenna feed point
 - The wattmeter should be inserted and the output power measured at the transmitter antenna jack
 - The wattmeter should be inserted and the output power measured at the Transmatch output
139. At what line impedance are RF wattmeters usually designed to operate? [3AD-5-1.3]
- 25 ohms
 - 50 ohms
 - 100 ohms
 - 300 ohms
140. What is a directional wattmeter? [3AD-5-1.4]
- An instrument that measures forward or reflected power
 - An instrument that measures the directional pattern of an antenna
 - An instrument that measures the energy consumed by the transmitter
 - An instrument that measures thermal heating in a load resistor
141. If a directional RF wattmeter indicates 90 watts forward power and 10 watts reflected power, what is the actual transmitter output power? [3AD-5-2.1]
- 10 watts
 - 80 watts
 - 90 watts
 - 100 watts
142. If a directional RF wattmeter indicates 96 watts forward power and 4 watts reflected power, what is the actual transmitter output power? [3AD-5-2.2]
- 80 watts
 - 88 watts
 - 92 watts
 - 100 watts
143. What is a marker generator? [3AD-6.1]
- A high-stability oscillator that generates a series of reference signals at known frequency intervals
 - A low-stability oscillator that "sweeps" through a band of frequencies
 - An oscillator often used in aircraft to determine the craft's location relative to the inner and outer markers at airports
 - A high-stability oscillator whose output frequency and amplitude can be varied over a wide range
144. What type of circuit is used to inject a frequency calibration signal into a communications receiver? [3AD-6.2]
- A product detector
 - A receiver incremental tuning circuit
 - A balanced modulator
 - A crystal calibrator
145. How is a marker generator used? [3AD-6.3]
- To calibrate the tuning dial on a receiver
 - To calibrate the volume control on a receiver
 - To test the amplitude linearity of an SSB transmitter
 - To test the frequency deviation of an FM transmitter